SUMMARY OF THE 2003 U.S. NORTH AND SOUTH PACIFIC ALBACORE TROLL FISHERIES

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INTRODUCTION

Albacore (*Thunnus alalunga*) are commercially harvested in the North Pacific by fisheries from various nations (Table 1). Japan harvests the greatest amount, annually taking 73% (since 1952) of the total amount of North Pacific albacore landed by all nations while the U.S. annually harvests less than 20%. U.S. vessels fish for albacore in the Pacific primarily with troll (also called jig) gear (artificial lures with barbless hooks that are towed behind a vessel). U.S. troll vessels have fished for albacore in the North Pacific since the early 1900's (Clemens and Craig, 1965). The collection of voluntary logbook data (daily catch and effort) from the U.S. North Pacific albacore troll fishery began in 1954 (Laurs et al., 1975a). The collection of length frequency data from the U.S. North Pacific albacore troll fishery began in 1951. The agencies currently involved in the collection of voluntary logbook, length frequency, and catch information from the U.S. Pacific albacore troll fisheries are the National Marine Fisheries Service's (NMFS) Southwest Fisheries Science Center (SWFSC, La Jolla) and Pacific Islands Fisheries Science Center (PIFSC, Honolulu), Pacific Islands Regional Office (PIRO, Pago Pago, American Samoa), Western Fishboat Owners Association (WFOA), American Fishermen's Research Foundation (AFRF), Pacific States Marine Fisheries Commission (PSMFC), and the state fisheries agencies of California, Oregon, and Washington.

Beginning in 1971, cooperative surveys between NMFS and AFRF led to the expansion of areas fished by U.S. troll vessels to areas north of Hawaii and west of the International Dateline (Laurs, et al., 1975b). In recent years, the North Pacific albacore troll season has begun as early as mid-April in areas northwest of Midway Atoll. In July and August, fishing effort expands to the east (160°W to 130°W, and 40°N to 45°N), and along the west coast of North America. Fishing areas along the west coast of North America extend from Vancouver Island to southern California. Fishing can continue into November if weather permits and sufficient amounts of albacore remain available to troll gear.

Albacore are also harvested in the South Pacific by a variety of nations (Table 2). Taiwan currently harvests the largest proportion of albacore caught annually in the South Pacific (32% since 1963). The annual U.S. portion of the South Pacific albacore catch has averaged 7% since 1994. Exploratory fishing for albacore with troll gear in areas east of New Zealand in 1986 resulted in the expansion of the U.S. albacore troll fishery to the South Pacific (Laurs et al., 1987). The collection of logbook and catch data from the fishery began in 1986, while length frequency data has been collected since 1987. PIRO in American Samoa collects these data from U.S. troll vessels. The fishery takes place during the austral summer months (November through April). U.S. troll vessels that participate in the South Pacific fishery depart from the U.S. west coast or Hawaii after the end of the North Pacific season and travel to American Samoa or

French Polynesia to prepare for the South Pacific season. South Pacific albacore fishing areas extend from the International Dateline to approximately 110°W between 25°S and 50°S. At the end of the season (March or April), most troll vessels unload in American Samoa, Fiji, or Tahiti and then travel to Hawaii or the U.S. west coast to prepare for the next North Pacific fishing season. Beginning in 1995 small vessels from American Samoa began to target albacore using longline gear in local waters. More information on Samoa longline fishing vessels can be found on the World Wide Web at http://wpacfin.nmfs.hawaii.edu/as/Pages/as_fish_1.htm. In 2000, several U.S. troll vessels changed gears and began using larger, pelagic longline gear to target albacore in areas further away from American Samoa.

This report presents summaries of the logbook, catch, and length frequency information collected from the U.S. albacore troll fleet during the 2003 North Pacific and the 2002-2003 South Pacific albacore seasons. Data from previous North Pacific seasons, South Pacific seasons, and from other fisheries (where available) are included for comparison. Electronic copies of this report for the years 1995 to 2002 are available on the World Wide Web at *http://swfsc.nmfs.noaa.gov/frd/HMS/Large%20Pelagics/Albacore/albie01.htm*.

DATA COLLECTED

Total annual catch data from the various fisheries that harvest albacore in the Pacific Ocean are available from 1952 to 2003 (Tables 1 and 2). Total catch estimates for U.S. troll vessels are provided by WFOA. Catch data from state landing receipts are obtained from the state fisheries agencies of California, Oregon, and Washington, Hawaii and from the Pacific Coast Fisheries Information Network (PacFIN). Daily catch and effort data are obtained from completed copies of the U.S. Pacific Albacore Logbook. The logbooks are voluntarily submitted by fishermen, transcribed by port samplers who collect the information from cooperating fishermen, or mailed to the SWFSC by vessel captains and owners. In addition to the voluntary logbook program, U.S. troll vessels that fish for albacore outside any exclusive economic zone (EEZ) are required by the High Seas Fisheries Compliance Act (HSFCA) to mail the logbook data from the time that they fished on the high seas to SWFSC. The implementation of a Highly Migratory Species Fisheries Management Plan for U.S. pelagic fisheries in the North Pacific in 2005 will require that all albacore troll fishermen submit copies of their logbooks to the SWFSC. Approximately 1,000 logbooks were distributed to fishermen for the 2003 North Pacific and the 2002-2003 South Pacific albacore seasons. Samplers in the ports of Ilwaco, Washington; Newport, Astoria, and Charleston Oregon; Terminal Island, California; and Pago Pago, American Samoa collected logbook, length frequency, and landings (catch) data during the 2003 North Pacific season. Samplers in Pago Pago collected logbook, length frequency, and catch data during the 2002-2003 South Pacific season.

North Pacific sea surface temperature (SST) data are recorded from commercial transport ships, fishing vessels, and research vessels. These data are collected by the National Weather Service's National Centers for Environmental Prediction (NCEP). These data are summarized by month and archived at the Climate Diagnostics Center (*http://www.cdc.noaa.gov/index.html*). The SST data from each month of the North Pacific albacore troll season were compiled with a resolution of 2° of latitude and longitude and computer-analyzed at the SWFSC. Contours of SSTs (isotherms) were created and are displayed with the general catch areas for North Pacific troll-caught albacore in figures 2a through 2f. Analysis of SSTs shows the distribution of

isotherms and the locations of temperature fronts (areas of closely-spaced isotherms). Albacore tend to congregate along these fronts in the North Pacific transition zone (Laurs and Lynn, 1977). Currently, there is insufficient SST information available from the areas of the South Pacific albacore troll fishery (east of New Zealand to 110°W and south of 25°S) to make a similar analysis possible.

TOTAL CATCH AND EFFORT

Total catch from the 2003 U.S. North Pacific albacore troll fishery increased to 17,237 metric tons (t) from 10,387 t landed in 2002 (Table 1). An estimated 718 U.S. troll vessels fished in the 2003 North Pacific fishery (Table 3), a 12% increase from 641 troll vessels that fished in 2002. Fishing effort in the albacore troll fisheries is measured in number of fishing days. The total number of fishing days is estimated by the following equation:

$$Effort(days) = Catch(pounds) \div [CPUE(^{fish}/_{day}) \times AverageWeight(^{pounds}/_{fish})]$$

U.S. troll vessels fished 25,398 days during the 2003 North Pacific albacore season, nearly the same as the 25,350 days fished in 2002. The average price paid for albacore caught by troll vessels in 2003 was $1,644 per short ton (82 cents per pound). This is a 2% increase from the average price of $1,603 per short ton (80 cents per pound) paid in 2002.

Since the South Pacific albacore troll fishery begins in November or December and can continue into April of the following year, season totals differ slightly from annual totals. The season catches of South Pacific albacore by troll gear are converted to annual totals and listed in Table 2. The annual catch of South Pacific albacore by troll gear increased 15% from 1,337 t in 2002 to 1,540 t in 2003. The 2002-2003 season catch by U.S. troll vessels increased 38% to 1,678 t from 1,218 t landed in the 2001-2002 season (Table 4). Fourteen U.S. troll vessels participated in the 2002-2003 South Pacific fishery compared to twelve vessels that fished in the 2001-2002 season. Total fishing effort for the 2002-2003 South Pacific albacore season is estimated to be 2,245 days, a decrease of 38% from 3,602 days fished in the 2001-2002 season. The average price paid for albacore caught by troll vessels in the South Pacific in the 2002-2003 season was $1,580 per short ton (79 cents per pound), a 9% increase from the average price of $1,450 per short ton (72 cents per pound) paid in the 2001-2002 season.

Albacore may be discarded during a fishing trip because they are undersized (less than 58 cm fork length or 9 pounds), damaged, or have spoiled due to refrigeration problems. During the 2003 North Pacific troll season 25 trips (of 342 sampled trips) recorded a total of 1,947 albacore discarded. Six trips (of eleven sampled trips) recorded 3,312 albacore discarded during the 2002-2003 South Pacific troll season. Albacore troll vessels catch minor amounts of other fish species, usually while in transit to or from the fishing grounds. The most common species that are incidentally caught include skipjack tuna (*Katsuwonus pelamis*), mahi mahi (*Coryphaena hippurus*), yellowtail (*Seriola lalandi*), Eastern Pacific bonito (*Sarda chiliensis*), bigeye tuna (*Thunnus obesus*), and bluefin tuna (*Thunnus thynnus*).

DISTRIBUTION OF CATCHES AND SSTS

Albacore catches recorded during the 2003 North Pacific albacore troll season were distributed from 159°E to the west coast of the U.S. and Canada, between approximately 30°N and 50°N (Figure 1). Areas of high catch indicate productive regions where albacore are available to troll gear. Based on sampled logbook data, the most productive offshore areas were located between 168°E and 173°E from 35°N to 39°N. The highest catch areas along the west coast were off Washington and Oregon between 125°W and 127°W, from 43°N to 47°N.

Figures 2a through 2f show the relationship between catch areas, SST fronts, and isotherm distribution patterns. The areas of highest catch in May were in SSTs ranging from 17°C to 18°C (63°F to 64°F; Figure 2a) between 170°E and 175°E, from 34°N to 37°N. High catch areas in June were located between 165°E and 175°E, from 34°N to 40°N in SSTs between 14°C and 21°C (57°F and 70°F) and also off the coasts of Washington and Oregon in SSTs from 12°C to 15°C (54°F and 59°F; Figure 2b). During July, high catches were widely distributed in SSTs that ranged from 13°C to 23°C (55°F to 73°F; Figure 2c). High catch areas along the west coast in July were in SSTs that ranged from 13°C to 17°C (55°F to 63°F) off of Washington and Oregon and in SSTs that ranged from 18°C to 19°C (64°F to 66°F) off Baja California. The high catch areas in the offshore region in July were in SSTs ranging from 19°C to 23°C (66°F to 73°F) from 170°E to 175°E, between 37°N and 40°N. High catch areas in August were distributed along the west coast from Vancouver Island to Northern California and were in SSTs ranging from 14°C to 18°C (57°F to 64°F; Figure 2d). In September, high catch areas were distributed from the Straits of Juan De Fuca to Cape Mendocino in SSTs ranging between 13°C and 18°C (55°F and 64°F; Figure 2e). High catch areas in October were distributed between the Columbia River and Cape Mendocino in SSTs between 13°C and 17°C (55°F and 63°F; Figure 2f).

Albacore catches recorded during the 2002-2003 South Pacific season were summarized by season and month in 5° squares of latitude and longitude (Figures 3a through 3e). The highest albacore catches of the season were made between 130°W and 135°W, from 35°S to 45°S (Figure 3a). The highest catches in December were less than 3,295 fish per 5° of latitude and longitude and were distributed between 155°W and 170°W from 30°S to 40°S (Figure 3b). January's highest catch areas ranged between 135°W and 150°W from 35°S to 45°S (Figure 3c). Catches in February were highest between 130°W and 135°W from 35°S to 45°S (Figure 3d). The highest catches in March were distributed between 130°W and 135°W, from 35°S to 40°S (Figure 3e).

CATCH-PER-UNIT EFFORT

Catch-Per-Unit Effort (CPUE) is used as an indication of relative abundance of albacore available to troll gear, or a measure of fishing success. It is expressed in numbers of fish caught per day fished for the U.S. troll fishery. Catch (in numbers of fish) and effort (in days fished) were summarized from logbook data by 10-day and 1°-square strata in which there was at least one day of fishing effort (Kleiber and Perrin, 1991). Average CPUE is calculated as follows:

$$Average\ CPUE = \frac{\sum_{i=1}^{n} \frac{C_i}{E_i}}{n}$$

Where C_i is the total sampled catch in the i^{th} stratum, E_i is the total sampled effort in the i^{th} stratum, and n is the total number of strata.

The CPUE for the North Pacific albacore troll fishery declined by approximately 68% between 1962 and 1977, then remained relatively stable between 1977 and 1991 (Figure 4). The CPUE increased from 1991 to 1998 with large fluctuations between 1995 and 1999. CPUEs have been increasing since 2000. The CPUE for the 2003 North Pacific season is 78 fish per day, an increase of 16% from 67 fish per day in the 2002 North Pacific season (Table 3). The ten-year average from 1994 through 2003 is 63 fish per day.

The CPUEs from the 2003 North Pacific season were averaged by season and 1° squares of latitude and longitude. The general distributions of CPUEs in 2003 were very similar to the distributions in 2002. The highest CPUEs for the 2003 North Pacific season ranged from 167 to 580 fish per day and were distributed in two major areas. In the offshore area, CPUEs were scattered between 166°E and 179°W, from 33°N to 40°N (Figure 5). In the coastal area high CPUEs were distributed between 126°W and 131°W, from 41°N to 50°N and between 121°W and 123°W, from 30°N to 31°N.

The CPUE for the U.S. South Pacific albacore troll fishery declined between 1987 and 1993 (Figure 4). The CPUE then peaked at 150 fish per day in 1995 and remained relatively stable at 70 fish per day through 2000. The CPUE dropped to 45 and 46 for the 2000-2001 and 2001-2002 South Pacific seasons, respectively. The CPUE for the 2002-2003 season is 103 fish per day, a 120% increase from 46 fish per day in the 2001-2002 season (Table 4). The ten-year average for CPUE in the South Pacific from 1994 through 2003 is 78 fish per day.

The CPUEs from the 2002-2003 South Pacific season were averaged by season and 5° squares of latitude and longitude. The highest averaged CPUEs for the 2002-2003 season ranged from 137 fish per day to 264 fish per day and were distributed between 120°W and 165°W, from 35°S to 45°S (Figure 6).

LOGBOOK SAMPLING COVERAGE

Logbook sampling coverage is expressed as the ratio of catches from sampled trips (those trips from which logbook data were received) to total catches. Not all catches from sampled trips are available. For consistent comparison of sampling coverage between seasons, sampled catches are estimated by multiplying numbers of fish caught (recorded in logbooks) by the average weight of those fish and summing these estimates from sampled logbooks.

A total of 342 trips (of an estimated 2,932 total trips) were sampled for logbook information during the 2003 North Pacific albacore troll season. Sampled catches totaled 4,947 t, resulting in a logbook sampling coverage rate of 29%, a decrease from 38% in 2002 (Table 3).

Logbook data from the 2002-2003 South Pacific albacore troll season were collected from 11 of the 14 trips made by U.S. vessels. The sampled catch from these trips is 933 t, resulting in a logbook sampling coverage of 56%, compared to 35% in the 2001-2002 season (Table 4).

LENGTH FREQUENCIES

Port samplers measured 11,933 albacore during the 2003 North Pacific season. Fork lengths of albacore measured during the 2003 North Pacific season ranged from 47 cm (5 lb or 2.1 kg) to 100 cm (45 lb or 20.4 kg) and averaged 75 cm (19 lb or 8.7 kg; Table 3). The average fork length of albacore measured during the 2002 season is 67 cm (14 lb or 6.2 kg). The histogram of length frequency samples from the 2003 North Pacific season shows two prominent modes centered at 65 cm (12 lb or 5.6 kg) and 81 cm (24 lb or 10.9 kg; Figure 7). The majority of albacore that are taken in both the North and South Pacific troll fisheries range from two to five years old. Length-weight relationships for North Pacific albacore are taken from Bartoo and Forman, 1993.

Small albacore (less than 58 cm fork length) may not be adequately represented in the length frequency data collected from the North Pacific fishery. Vessels that sell most of their catch to canneries or buying stations (which may pay less for small fish) might discard small fish when they are abundant in the catches. Troll vessels that sell their fish to markets where small fish are preferred might retain more small fish. These fish are usually not available to port samplers for measuring.

Port samplers measured 1,229 albacore during the 2002-2003 South Pacific troll season. Sampled (measured) albacore ranged from 44 cm (4 lb or 1.8 kg) to 103 cm (49 lb or 22.3 kg) and averaged 71 cm (16 lb or 7.3 kg; Table 4). The average fork length of sampled albacore from the 2001-2002 season is also 71 cm. One mode is evident in the histogram of fish sampled in the 2002-2003 season (Figure 8). It is centered at 67 cm (14 lb or 6.2 kg).

LENGTH FREQUENCY SAMPLING COVERAGE

Length frequency sampling coverage is expressed as the ratio of the number of fish sampled (measured) to the total number of fish landed for the season. The total number of fish landed for the season is estimated by dividing total catch by the average weight of fish landed. A total of 11,933 albacore were measured during the 2003 North Pacific season out of an estimated 1,984,081 fish landed, resulting in a length frequency sampling coverage of 0.6%, very similar to the 2002 sampling coverage of 0.7% (Table 3).

Port samplers in Pago Pago, American Samoa measured 1,229 of the estimated 230,849 albacore landed during the 2002-2003 South Pacific albacore fishery. The length frequency sampling coverage rate for this season is 0.5%, compared to 0.3% in the 2001-2002 season (Table 4).

SUMMARY

The 2003 U.S. North Pacific albacore troll fishery produced the highest amount of albacore caught since 1975. Approximately 718 vessels landed 17,237 t during the 2003 season

compared to 641 vessels that landed 10,387 t in 2002; a 66% increase in total catch. Total effort remained nearly constant at 25,398 days. The highest catches of albacore in the North Pacific generally were distributed between the 12°C (54°F) and 23°C (73°F) isotherms. The average CPUE for the 2003 North Pacific season increased from 67 fish per day in 2002 to 78 fish per day. The most successful catch areas (areas with high CPUEs) ranged between 166°E and 172°E, from 35°N to 40°N and between 126°W and 131°W, from 41°N to 50°N. Logbook sampling coverage for the North Pacific albacore fishery dropped from 38% in the 2002 season to 29% in 2003. The average fork length of sampled albacore from the 2003 season was 75 cm (19 lb or 8.7 kg). The average fork length of albacore measured during the 2002 season was 67 cm (14 lb or 6.2 kg). Fish less than 58 cm fork length (9 lb or 4.0 kg) may not be adequately represented in the North Pacific length frequency samples due to discarding of small fish at sea or marketing practices that make them unavailable for sampling. Length frequency sampling coverage was nearly the same in 2003 as in 2002 at 0.6%.

Total catch from the 2002-2003 South Pacific season increased from 1,218 t in the 2001-2002 season to 1,678 t. The annual catch also increased from 1,337 t in 2002 to 1,540 t in 2003. Fourteen U.S. troll vessels fished 2,245 days in the 2002-2003 season compared to 12 vessels that fished 3,602 days in the 2001-2002 season. The areas of highest catch for the 2003-2003 South Pacific season ranged between 130°W and 135°W and from 35°S to 45°S. The CPUE for the 2002-2003 season increased 120% from 46 fish per day in the 2001-2002 season to 103 fish per day. Logbook sampling coverage for the 2002-2003 South Pacific albacore troll fishery increased from 35% in the 2001-2002 season to 56% in the 2002-2003 season. The average fork length of albacore measured during the 2002-2003 season remained the same as the 2001-2002 season at 71 cm (16 lb or 7.3 kg). Length frequency sampling coverage also increased from 0.3% in the 2001-2002 season to 0.5% in the 2002-2003 season.

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Table 1. North Pacific albacore catches (in metric tons) by fisheries, 1952-2003[1]. Blank indicates no effort. -- indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates are in parentheses.

YEAR	CANADA[2]		JAPAN[3]						KOREA[4]		MEXICO[5]
	TROLL	PURSE SEINE	GILL NET	LONG LINE	POLE & LINE	PURSE SEINE	TROLL	UNSP. GEAR	GILL NET	LONG LINE	UNSP. GEAR
1952	71			26,687	41,787	154		237			
1953	5			27,777	32,921	38		132			
1954				20,958	28,069	23		38			
1955				16,277	24,236	8		136			
1956	17			14,341	42,810			57			
1957	8			21,053	49,500	83		151			
1958	74			18,432	22,175	8		124			
1959	212			15,802	14,252			67			
1960	5	136		17,369	25,156			76			
1961	4			17,437	18,639	7		268			0
1962	1			15,764	8,729	53		191			0
1963	5			13,464	26,420	59		218			0
1964	3			15,458	23,858	128		319			0
1965	15			13,701	41,491	11		121			0
1966	44			25,050	22,830	111		585			0
1967	161			28,869	30,481	89		520			
1968	1,028			23,961	16,597	267		1,109			
1969	1,365			18,006	31,912	521		935			0
1970	390			16,283	24,263	317		456			0
1971	1,746			11,524	52,957	902		308			0
1972	3,921		1	13,043	60,569	277		623			100
1973	1,400		39	16,795	68,767	1,353		495			0
1974	1,331		224	13,409	73,564	161		879			1
1975	111		166	10,318	52,152	159		228		2,463	1
1976	278		1,070	15,825	85,336	1,109		272		859	36
1977	53		688	15,696	31,934	669		355		792	0
1978	23		4,029	13,023	59,877	1,115		2,078		228	1
1979	521		2,856	14,215	44,662	125		1,126	0	259	1
1980	212		2,986	14,689	46,742	329		1,179	6	597	31
1981	200		10,348	17,922	27,426	252		663	16	459	8
1982	104		12,511	16,767	29,614	561		440	113	387	7
1983	225		6,852	15,097	21,098	350		118	233	454	33
1984	50		8,988	15,060	26,013	3,380		511	516	136	113
1985	56		11,204	14,351	20,714	1,533		305	576	291	49
1986	30		7,813	12,928	16,096	1,542		626	726	241	3
1987	104		6,698	14,702	19,082	1,205		155	817	549	7
1988	155		9,074	14,731	6,216	1,208		134	1,016	409	15
1989	140		7,437	13,104	8,629	2,521		393	1,023	150	2
1990	302		6,064	15,789	8,532	1,995		249	1,016	6	2
1991	139		3,401	17,046	7,103	2,652		392	852	3	2
1992	363		2721	19049	13888	4104		1527	271	(15)	10
1993	494		287	29966	12797	2889		867		(32)	11
1994	1998		263	29612	26389	2026		799		(45)	6
1995	1720		282	29080	20981	1177	856	81		440	5
1996	3591		116	32492	20272	581	815	117		333	21
1997	2433		359	38988	32238	1068	1585	123		319	53
1998	4188		206	35813	22926	1554	1190	88		(288)	8
1999	2641		289	33365	50369	6872	891	127		107	23
2000	4465		67	30032	21549	2408	645	171		414	428
2001	4985		117	28809	29430	974	416	96		82	18
2002	4,996		(332)	(23,917)	(48,454)	(4,303)	(787)	(135)		(146)	(0)
2003	(6,754)	(0)	(332)	(23,917)	(35,222)	(683)	(787)	(135)	(0)	(146)	(0)

[1] Data are from North Pacific Albacore Workshop meetings except as noted.

[2] 1960 Canadian purse seine catch from Shaver (1962). 1994 troll catch from Shaw, 2001.

[3] Japanese pole & line catches include fish caught by research vessels. Longline catches for 1952-1960 exclude minor amounts taken by vessels under 20 metric tons.

[4] Korean longline catches for 1975 to 1986 calculated from Y. Gong (pers. comm.) using the ratio of catches in numbers, from the North Pacific. Gillnet catches for 1979-1990 are calulated by multiplying the 1991 CPUE (# fish per pok) by effort (# poks) then multiplying by average weight (1991, 1992: 4.13 kg/fish). 1987 - 1991 catches provided by Inter-American Tropical Tuna Commission (M. Hinton, pers.com.). 1992 - 2002 catches provided by D. Moon (pers. com.)

[5] 1998-2002 Mexico catch from purse seine and bait boats. Catches provided by Inter-American Tropical Tuna Commission (M. Hinton, pers.com.)

Table 1. Continued

YEAR	TAIWAN		U.S.							OTHERS		GRAND TOTAL
	GILL NET	LONG LINE	POLE & LINE	GILL NET	LONG[6] LINE	PURSE SEINE	SPORT	TROLL[7]	UNSP. GEAR	LONG[8] LINE	TROLL[9]	
1952					46		1,373	23,843				94,198
1953					23		171	15,740				76,807
1954					13		147	12,246				61,494
1955					9		577	13,264				54,507
1956					6		482	18,751				76,464
1957					4		304	21,165				92,268
1958					7		48	14,855				55,723
1959					5		0	20,990	0			51,328
1960					4		557	20,100	0			63,403
1961			2,837		5		1,355	12,055	1			52,608
1962			1,085		7		1,681	19,752	1			47,264
1963			2,432		7		1,161	25,140	0			68,906
1964		26	3,411		4		824	18,388	0			62,419
1965		261	417		3		731	16,542	0			73,293
1966		271	1,600		8		588	15,333	1			66,421
1967		635	4,113		12		707	17,814	0			83,401
1968		698	4,906		11		951	20,434	0			69,962
1969		634	2,996		14		358	18,827	0			75,568
1970		1,516	4,416		9		822	21,032	0			69,504
1971		1,759	2,071		11		1,175	20,526	0			92,979
1972		3,091	3,750		8		637	23,600	0			109,621
1973		128	2,236		14		84	15,653	0			106,964
1974		570	4,777		9		94	20,178	0			115,197
1975		1,494	3,243		33		640	18,932	10			89,950
1976		1,251	2,700		23		713	15,905	4			125,381
1977		873	1,497		37		537	9,969	0			63,100
1978		284	950		54		810	16,613	15			99,100
1979		187	303		--		74	6,781	0			71,110
1980	--	318	382		--		168	7,556	0			75,195
1981	--	339	748		25		195	12,637	0			71,238
1982	--	559	425		105		257	6,609	21			68,481
1983	--	520	607		6		87	9,359	0			55,039
1984	--	471	1,030		2	3,728	1,427	9,304	0			70,729
1985	--	109	1,498	2	0		1,176	6,415	0			58,279
1986	--	--	432	3			196	4,708	0			45,344
1987	2,514	--	158	5	150		74	2,766	0			48,986
1988	7,389	38	598	15	308		64	4,212	10			45,592
1989	8,350	544	54	4	249		160	1,860	23			44,644
1990	16,701	287	115	29	177	71	24	2,603	4			53,966
1991	3,398	353	0	17	313	0	6	1,845	71			37,594
1992	7,866	300	0	0	337	0	2	4,572	72			(55,096)
1993		494		0	440		25	6,254	0			(54,556)
1994		586	0	38	546		106	10,978	213		158	(73,763)
1995		2,504	80	52	883		102	8,045	1		137	66,426
1996		3,594	24	83	1,187	11	88	16,938	0	1,735	505	82,503
1997		4,199	73	60	1,652	2	1,018	14,252	1	2,824	404	101,651
1998		4,797	79	80	1,120	33	1,208	14,410	2	5,871	286	(94,147)
1999		4,768	60	149	1,540	48	3,621	10,060	1	6,307	261	121,499
2000		5,866	69	55	940	4	1,798	9,645	3	6,307	490	85,355
2001		4,641	139	94	1,295	51	1,635	11,210	0	6,307	127	90,427
2002		(7,491)	378	30	525	3	(2,357)	10,387		(6,307)	(127)	(110,676)
2003		(7,491)	(59)	(15)	(521)	(44)	(2,212)	(17,237)	(2)	(6,307)	(127)	(118,844)

[6] Hawaii catches for 1987 through 1999 are from Ito and Machado, 2001. Hawaii catches for 2000 through 2003 are from Ito (pers. Comm.).

[7] U.S. troll catches for 1952-1960 include fish caught by pole & line vessels. U.S. troll catches for 1984-1988 include gillnet catches.

[8] Other longline catches from vessels flying flags of convenience being called back to Taiwan.

[9] Other troll catches from vessels registered in Belize, Cook Islands, Tonga, and Ecuador

Table 2. South Pacific albacore catches (in metric tons) by fisheries, 1952-2003[1]. Blank indicates no effort. -- indicates data not available. 0 indicates less than 1 metric ton. Provisional estimates are in parentheses.

YEAR	JAPAN			TAIWAN		KOREA		U.S.		CANADA	NEW ZEALAND			FRENCH POLYNESIA	
	GILL NET	LONG[2] LINE	POLE & LINE	GILL NET	LONG LINE	GILL NET	LONG LINE	LONG[3] LINE	TROLL	TROLL	LONG LINE	POLE & LINE	TROLL[4]	LONG LINE	TROLL[5]
1952		154	--												
1953		803	--												
1954		9,578	--		--										
1955		8,625	--		--										
1956		7,281	--		--										
1957		8,757	--		--										
1958		18,490	--		--		146								
1959		17,385	--		--		456								
1960		21,638	45		--		610								
1961		23,412	0		--		330								
1962		34,620	0		--		599								
1963		29,120	16		608		1,367								
1964		19,390	0		629		2,911								
1965		17,793	0		1,640		6,405								
1966		21,627	0		6,669		10,817								
1967		15,104	0		11,497		13,717						5		
1968		6,659	0		12,254		10,138						14		
1969		4,894	0		9,503		9,963						--		
1970		6,507	0		14,484		11,599						50		
1971		4,355	0		15,871		14,482						--		
1972		2,729	22		16,674		14,439						268		
1973		2,452	41		17,741		17,452						484		
1974		1,934	709		16,857		12,194						898		
1975		1,060	0		16,056		9,015						646		
1976		1,836	0		13,206		9,058						25		
1977		2,182	0		21,429		11,229						621		
1978		2,489	0		20,702		11,658						1,686		
1979		2,320	0		14,987		11,411						814		
1980		2,555	1		17,998		10,449						1,468		
1981		4,898	0		14,390		13,342						2,085		
1982		4,822	1		12,634		10,769						2,434		
1983	32	4,991	0		12,069		7,069	5					744		
1984	1,581	3,598	2		11,155		5,321	9					2,773		
1985	1,928	3,676	0		9,601		13,544	11					3,253		
1986	1,936	4,466	0		11,913		15,877		92				1,911		
1987	919	4,103	9		15,009		6,821		838				1,256		
1988	4,271	6,914	0	1,000	17,120		6,563	1	3,656	235			405		
1989	13,263	5,353	0	8,520	10,867	172	5,151		3,672	235	9		4,361		102
1990	5,567	5,466	0	1,859	11,619		3,947		3,886	235	170	242	2,599	20	355
1991		4,700	0	1,394	16,508		1,866	1	4,894	235	85	9	2,365	100	391
1992		5,268	0		20,956		2,271		2,956	235	209	6	3,272	195	115
1993		8,294	12		17,701		1,083	0	1,010	235	345	60	2,982	714	86
1994		8,883	2		19,731		0	1	2,270	235	635	62	4,620	913	61
1995		7,350	0		12,775		8	1	1,951	235	810	136	5,349	772	255
1996		4,538	0		11,909		215	86	1,947	136	1,079	26	5,241	1,463	153
1997		4,797	12		15,662		845	309	1,739	149	847	0	2,781	2,595	102
1998		7,830	38		13,812		3,514	446	1,618	167	2,057	1	4,468	3,189	38
1999		3,872	100		13,684		1,552	338	1,339	253	2,103	0	1,800	2,580	61
2000		2,855	22		15,917		916	622	2,433	351	1,344	72	3,084	3,473	97
2001		4,798	18		12,026		(1,909)	3,230	2,107	206	2,093	4	3,256	4,261	155
2002		(4,798)	(18)		(7,850)		(3,363)	(5,947)	1,337	(144)	(2,326)	(237)	(3,312)	(4,557)	(106)
2003		(4,798)	(18)		(7,850)		(3,363)	(3,899)	(1,540)	(144)	(2,326)	(237)	(3,312)	(4,557)	(106)

[1] Data are from the Fifteenth Meeting of the Standing Committee on Tuna and Billfish and SPC Tuna Fishery Yearbook 2002, except as noted. All catches are from areas within the SPAR statistical area except as noted.

[2] Japan longline catches include catches from Australia-Japan joint venture vessels.

[3] 1982 - 1993 U. S. longline catches are from Pelagic Fisheries of the Western Pacific Region 1996 and 1998 Annual Reports. 2000 - 2003 catches are from the Western Pacific Fishery Information Network.

[4] 1990 - 2001 New Zealand troll include unclassified vessels.

[5] French Polynesia troll catches include catches from Bonitier and Poti Marara vessels. No Japanese data available from SCTB15.

Table 2. Continued

YEAR	AUSTRALIA		NEW CALEDONIA	TONGA	FIJI	WESTERN SAMOA	SOLOMON ISLANDS	CHILE[7]	VANUATU	CHINA	OTHER		GRAND TOTAL
	LONG LINE	TROLL[6]	LONG LINE	LONG LINE	LONG LINE	LONG LINE	LONG LINE	DRIFT NET	LONG LINE	LONG LINE	LONG[8] LINE	TROLL[9]	
1952													154
1953													803
1954													9,578
1955													8,625
1956													7,281
1957													8,757
1958													18,636
1959													17,841
1960													22,293
1961													23,742
1962													35,219
1963													31,111
1964													22,930
1965													25,838
1966													39,113
1967													40,323
1968													29,065
1969													24,360
1970		100											32,740
1971		100											34,808
1972		100											34,232
1973		100					4						38,274
1974		100											32,692
1975		100											26,877
1976		100					6						24,231
1977		100					9						35,570
1978		100					9						36,644
1979		100					21						29,653
1980		100					25						32,596
1981		5					2						34,722
1982		6		106			8						30,780
1983		7	12	143			19						25,091
1984		8	112	135			19						24,713
1985	0	9	131	174			12						32,339
1986	0	10	179	206									36,590
1987	129	11	563	252									29,910
1988	107	12	584	242						0			41,110
1989	93	13	566	195	3					0			52,575
1990	124	15	1,053	152	68					4			37,381
1991	158	20	909	171	208					0		4	34,018
1992	214	70	692	199	243					0			36,901
1993	186	55	755	231	463	213				1			34,426
1994	357	70	840	343	842	641				8	23	46	40,583
1995	438	25	332	379	702	1,883	24	15	109	5	38	47	33,639
1996	408	50	414	431	1,446	1,775	100	21	192	8	43	186	31,867
1997	302	50	277	464	1,842	4,108	109	0	95	2	101	327	37,514
1998	460	60	860	616	2,121	4,742	370	0	10	1	104		46,522
1999	359	50	690	801	2,279	4,027	136	0	--	3,473	129	95	39,721
2000	381	50	895	862	6,065	4,067	224	0	--	2,056	159	372	46,317
2001	570	59	1,020	1,268	7,971	4,820	54	(0)	--	(2,711)	125	187	(52,847)
2002	553	52	1,165	1,199	8,026	4,360	115	(0)	(225)	(2,920)	1,015	70	(53,695)
2003	(553)	(52)	(1,165)	(1,199)	(8,026)	(4,360)	(115)	(0)	(225)	(2,920)	(282)	(54)	(51,100)

[6] Australia troll catches from 1970 to 1980 are incidental catches from pole-and-line vessels targeting southern bluefin tuna. 1981-2002 catches include recreational catches.

[7] Chile gill net catches are from outside the SPAR statistical area and are from R. Serra (pers. comm.).

[8] "Other" includes Cook Islands and Papua New Guinea.

[9] "Other" includes Fiji, Cook Islands, Belize, Sweden, Tonga, and Ecuador.

Table 3. Fishery statistics for the U.S. North Pacific albacore troll fishery.

FISHING SEASON	NO. TRIPS		CATCH (Metric Tons)		NO. FISH LANDED		AVG FL (cm)	AVG WT (lb)	EFFORT		CPUE (fish/day)	SAMPLING COVERAGE	
	TOTAL	SAMPLED	TOTAL	SAMPLED	TOTAL	MEASURED			NO. DAYS	NO. VESSELS		LOG	L-F
1992	1,590	295	4,572	1,940	864,041	25,053	64	11.7	17,032	603	51	42%	2.9%
1993	1,704	175	6,254	1,390	810,783	204	72	17.0	21,415	518	38	22%	0.0%
1994	2,135	406	10,978	4,534	1,616,437	1,067	69	15.0	26,072	686	62	41%	0.1%
1995	1,094	353	8,045	5,031	1,170,399	15,283	69	15.2	25,650	464	46	63%	1.3%
1996	1,816	413	16,938	7,049	2,918,060	32,144	66	12.8	32,717	640	89	42%	1.1%
1997	4,000	493	14,252	5,437	2,050,302	31,223	70	15.3	45,572	1,121	45	38%	1.5%
1998	2,358	267	14,410	5,061	2,217,166	15,603	68	14.3	21,445	755	103	35%	0.7%
1999	2,555	393	10,060	3,549	1,246,107	14,263	73	17.8	34,643	705	36	35%	1.1%
2000	2,306	424	9,645	3,967	1,444,331	11,636	69	14.7	37,331	649	39	41%	0.8%
2001	3,554	473	11,210	5,493	1,739,301	13,907	68	14.2	26,566	870	65	49%	0.8%
2002	2,508	346	10,387	3,953	1,687,542	12,146	67	13.6	25,350	641	67	38%	0.7%
2003	2,932	342	17,237	4,947	1,984,081	11,933	75	19.2	25,398	718	78	29%	0.6%

Table 4. Fishery statistics for the U.S. South Pacific albacore troll fishery.

FISHING SEASON	NO. TRIPS		CATCH1 (Metric Tons)		NO. FISH LANDED		AVG FL (cm)	AVG WT (lb)	EFFORT		CPUE (fish/day)	SAMPLING COVERAGE	
	TOTAL	SAMPLED	TOTAL	SAMPLED	TOTAL	MEASURED			NO. DAYS	NO. VESSELS		LOG	L-F
1991-1992	65	39	3,097	1,955	470,243	4,758	68	14.5	6,867	55	68	63%	1.0%
1992-1993	45	8	1,036	195	199,529	1,720	63	11.4	4,687	44	43	19%	0.9%
1993-1994	17	8	2,236	262	371,248	794	66	13.3	3,848	14	96	12%	0.2%
1994-1995	29	22	1,953	1,152	278,616	1,509	70	15.5	1,894	21	147	59%	0.5%
1995-1996	55	31	1,964	1,119	285,075	2,069	70	15.2	4,145	53	69	57%	0.7%
1996-1997	26	18	1,617	956	252,422	1,215	68	14.1	3,063	26	82	59%	0.5%
1997-1998	38	31	1,701	1,100	277,050	200	67	13.5	5,384	36	51	65%	0.1%
1998-1999	24	12	1,241	516	173,549	689	70	15.8	2,505	21	69	42%	0.4%
1999-2000	39	26	2,562	1,578	339,768	1,255	72	16.6	4,957	36	69	62%	0.4%
2000-2001	39	30	2,128	1,449	289,517	3,416	71	16.2	6,377	33	45	68%	1.2%
2001-2002	12	10	1,218	426	166,338	513	71	16.1	3,602	12	46	35%	0.3%
2002-2003	14	11	1,678	933	230,849	1,229	71	16.0	2,245	14	103	56%	0.5%

[1] Total catches for U.S. South Pacific albacore troll fishery may include catch from November and December of the previous year. Total catches for seasons before 1996-97 may contain catch from non-U.S. vessels.

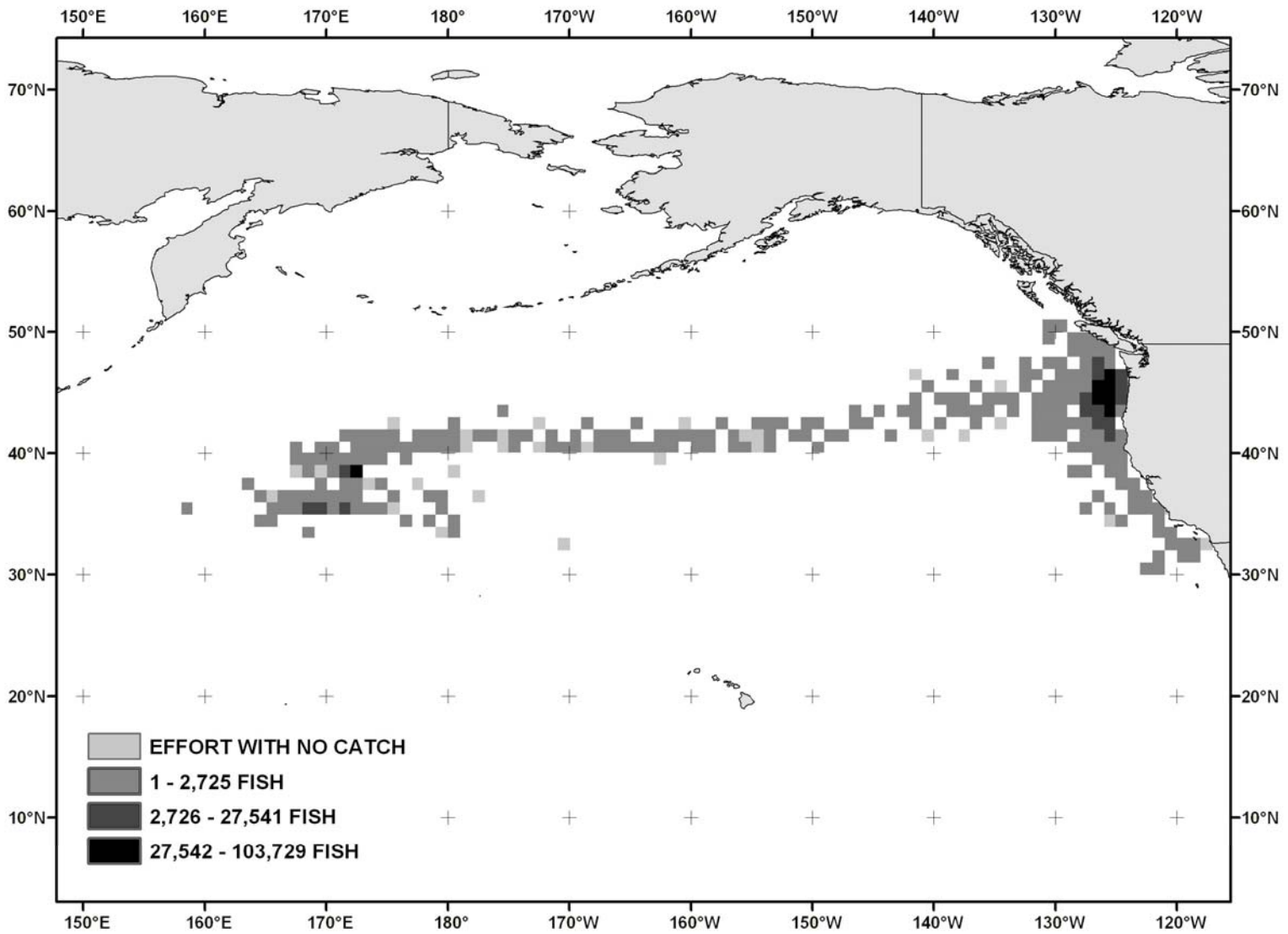

Figure 1. Distribution of albacore catches by U.S. troll vessels in the 2003 North Pacific season.

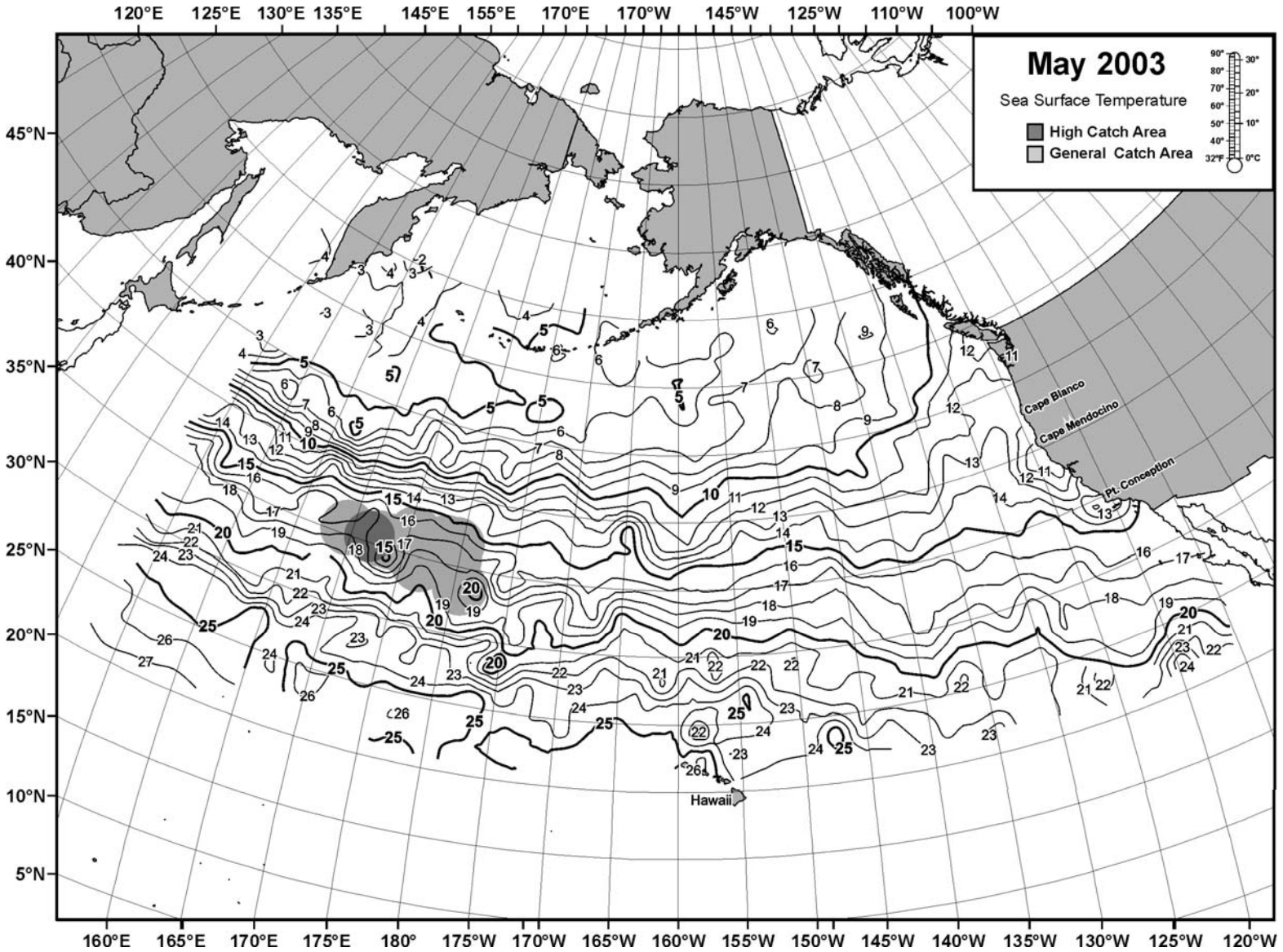

Figure 2a. Distribution of albacore catches and sea surface temperatures in May 2003.

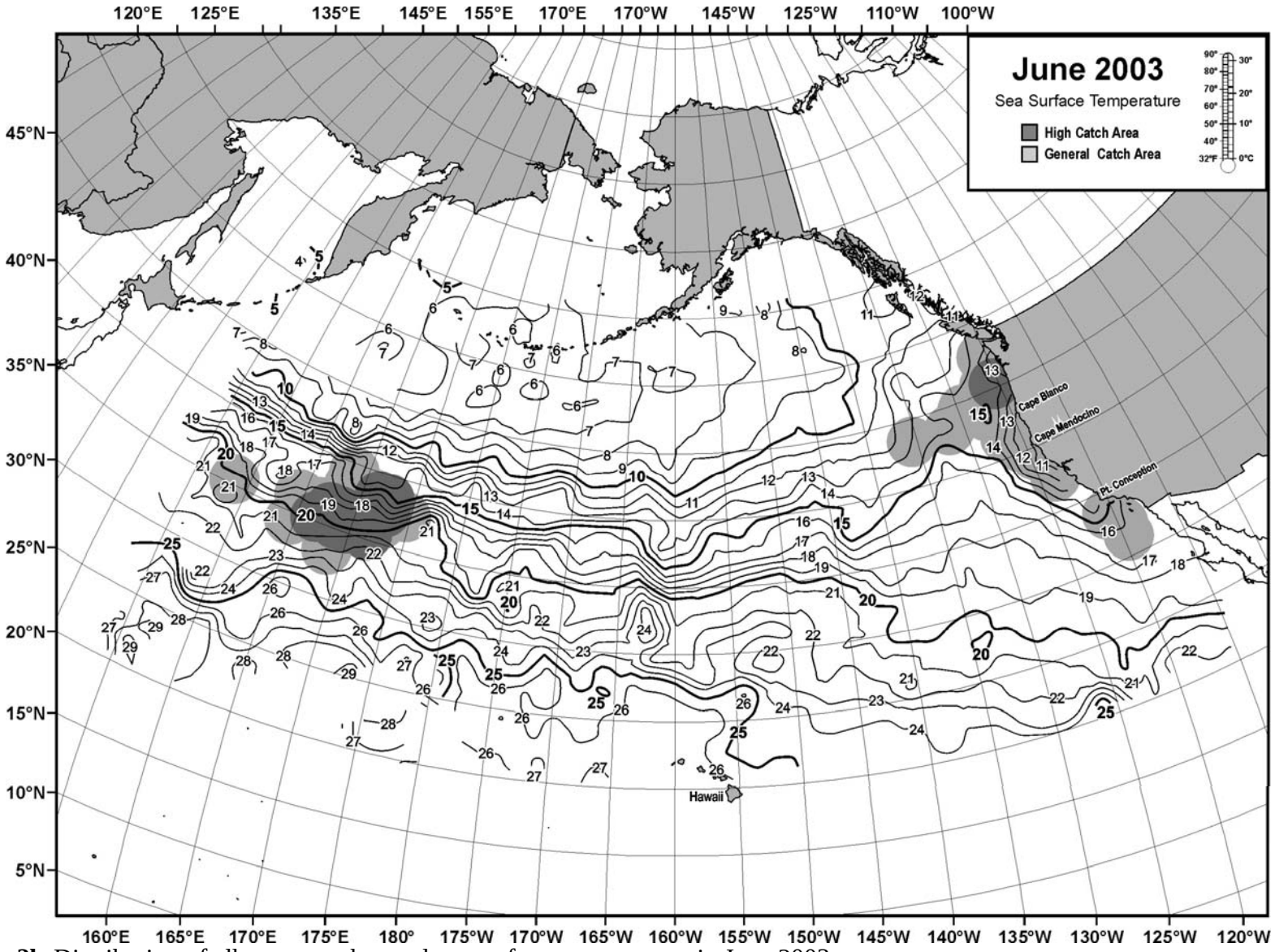

Figure 2b. Distribution of albacore catches and sea surface temperatures in June 2003.

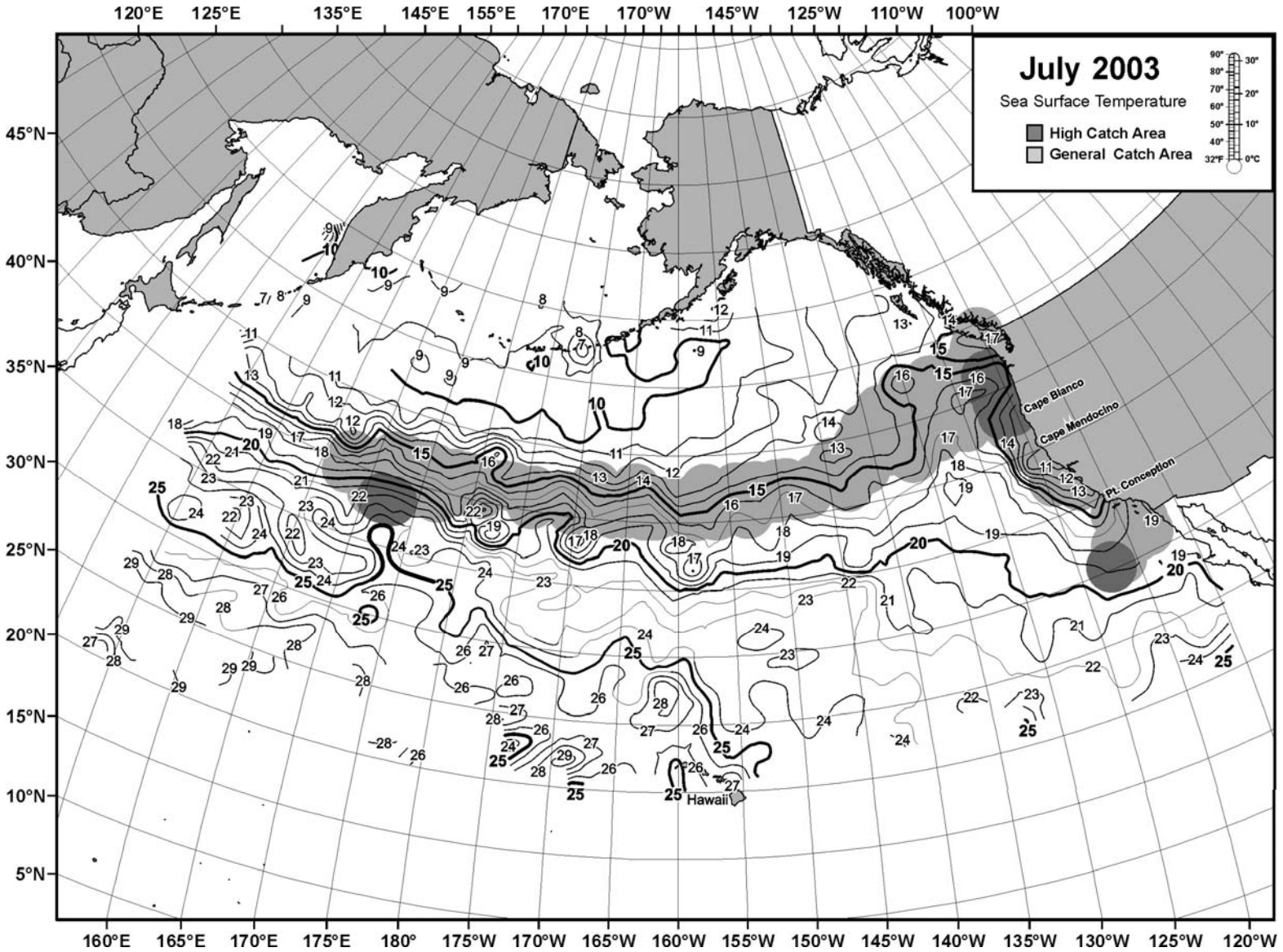

Figure 2c. Distribution of albacore catches and sea surface temperatures in July 2003.

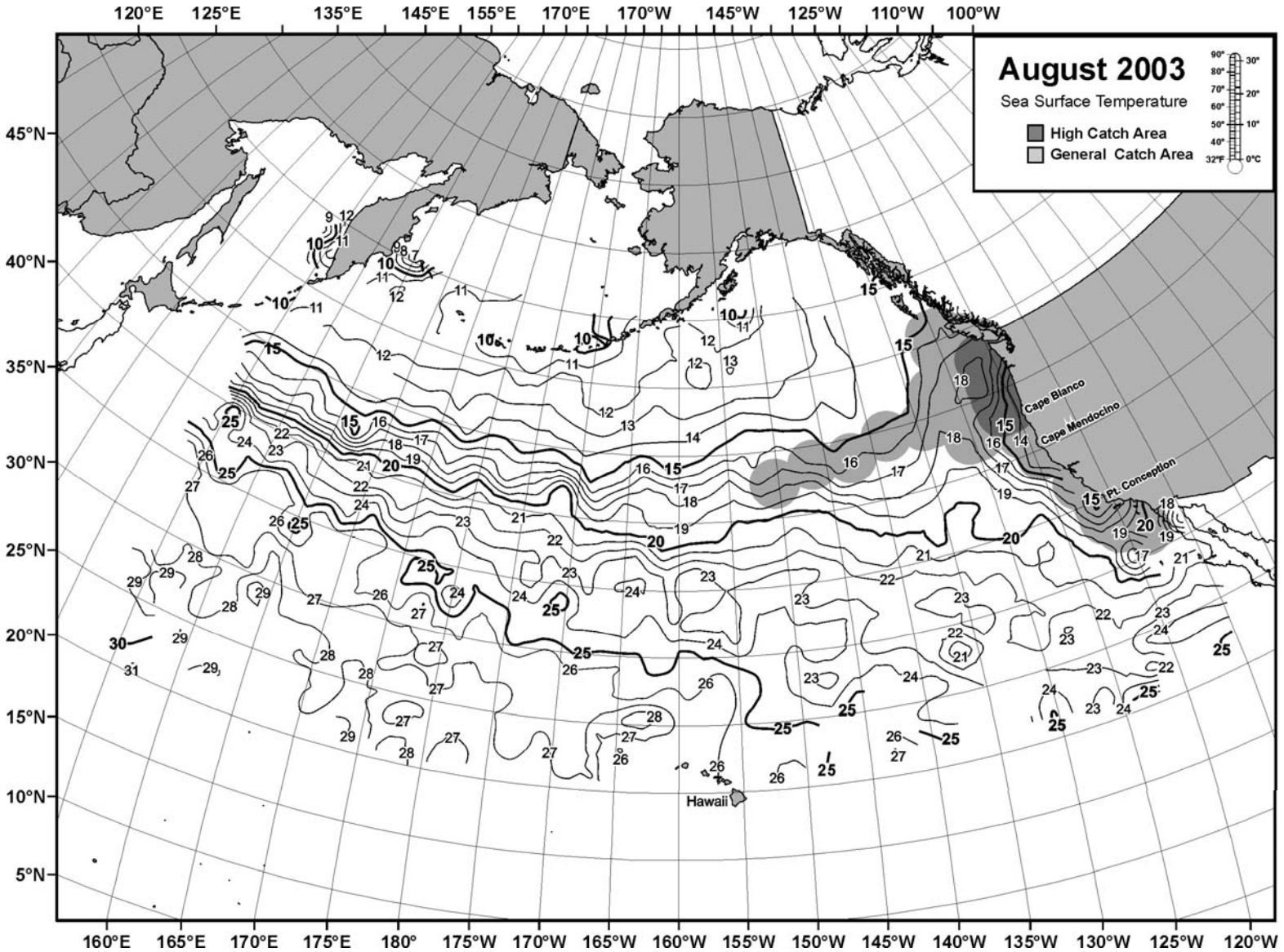

Figure 2d. Distribution of albacore catches and sea surface temperatures in August 2003.

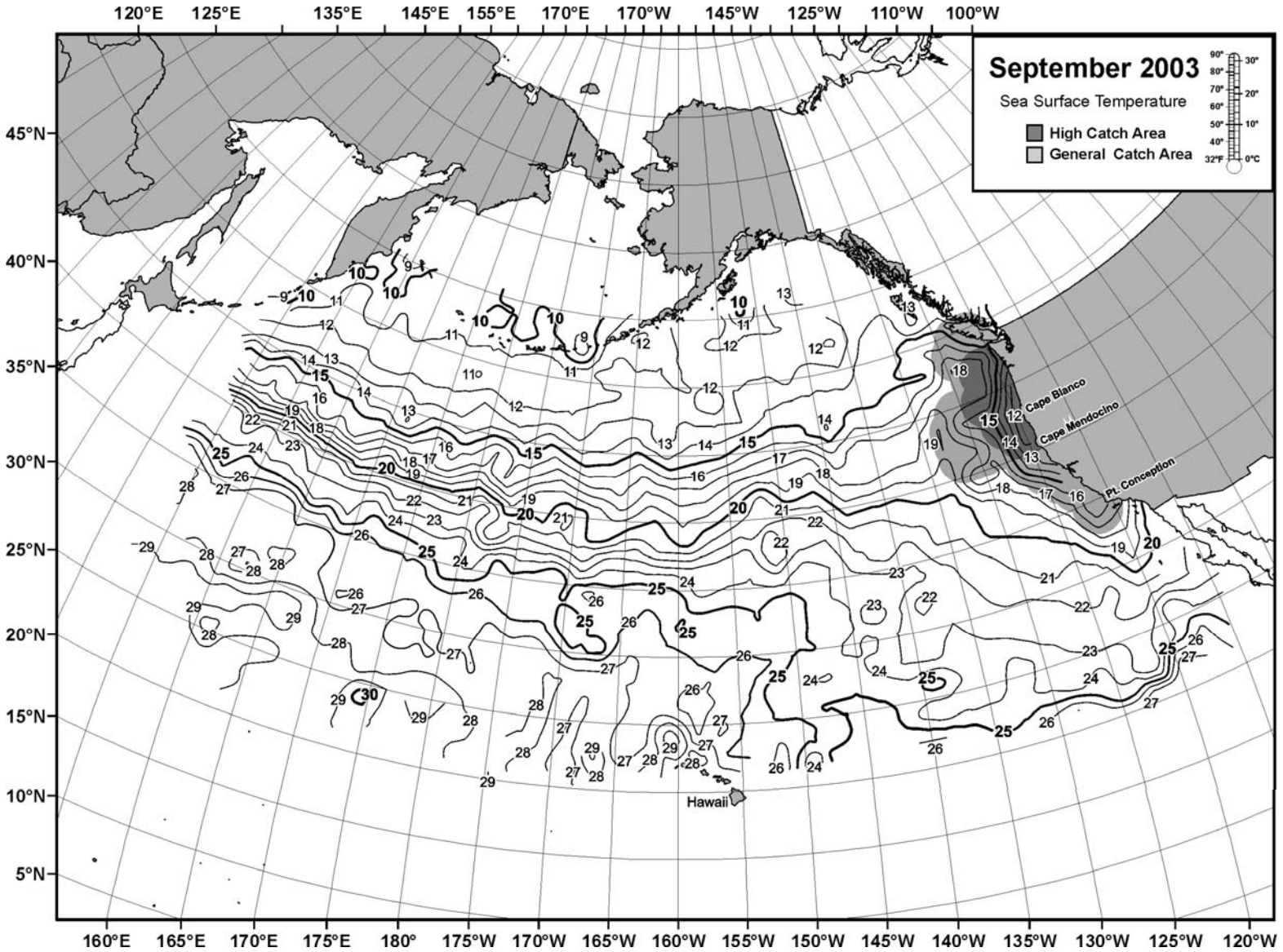

Figure 2e. Distribution of albacore catches and sea surface temperatures in September 2003.

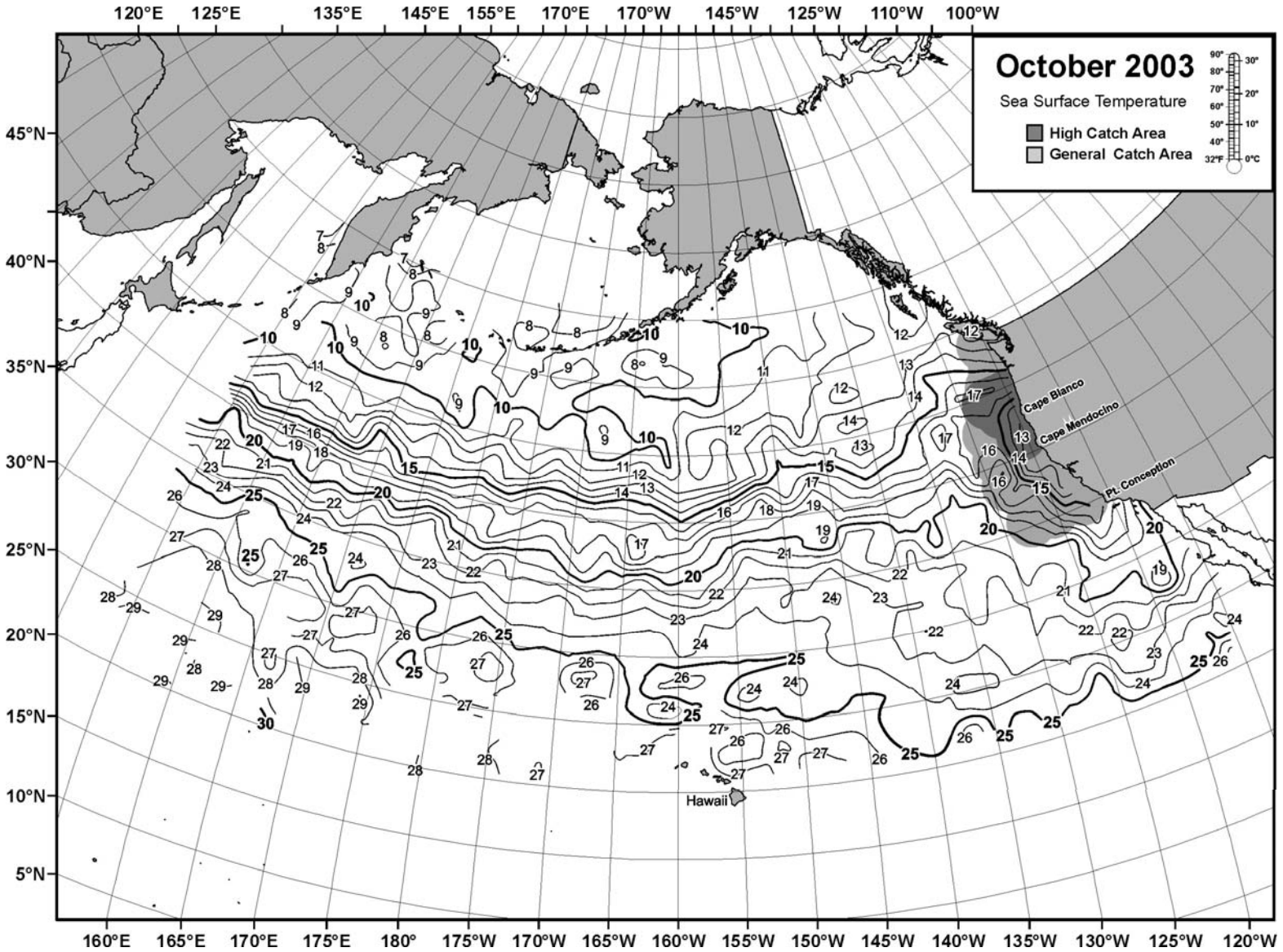

Figure 2f. Distribution of albacore catches and sea surface temperatures in October 2003.

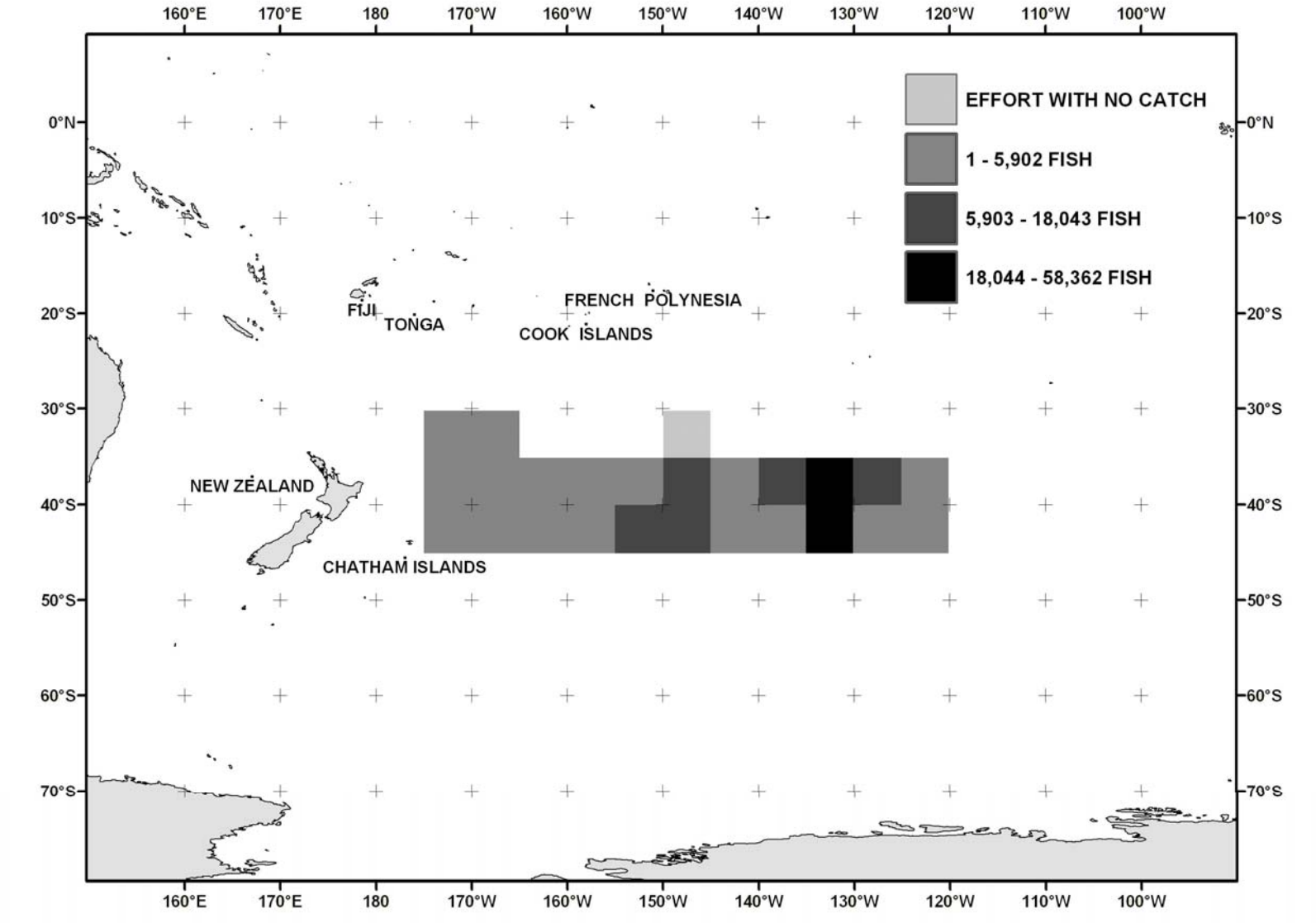

Figure 3a. Distribution of albacore catches by U.S. troll vessels in the 2002-2003 South Pacific season.

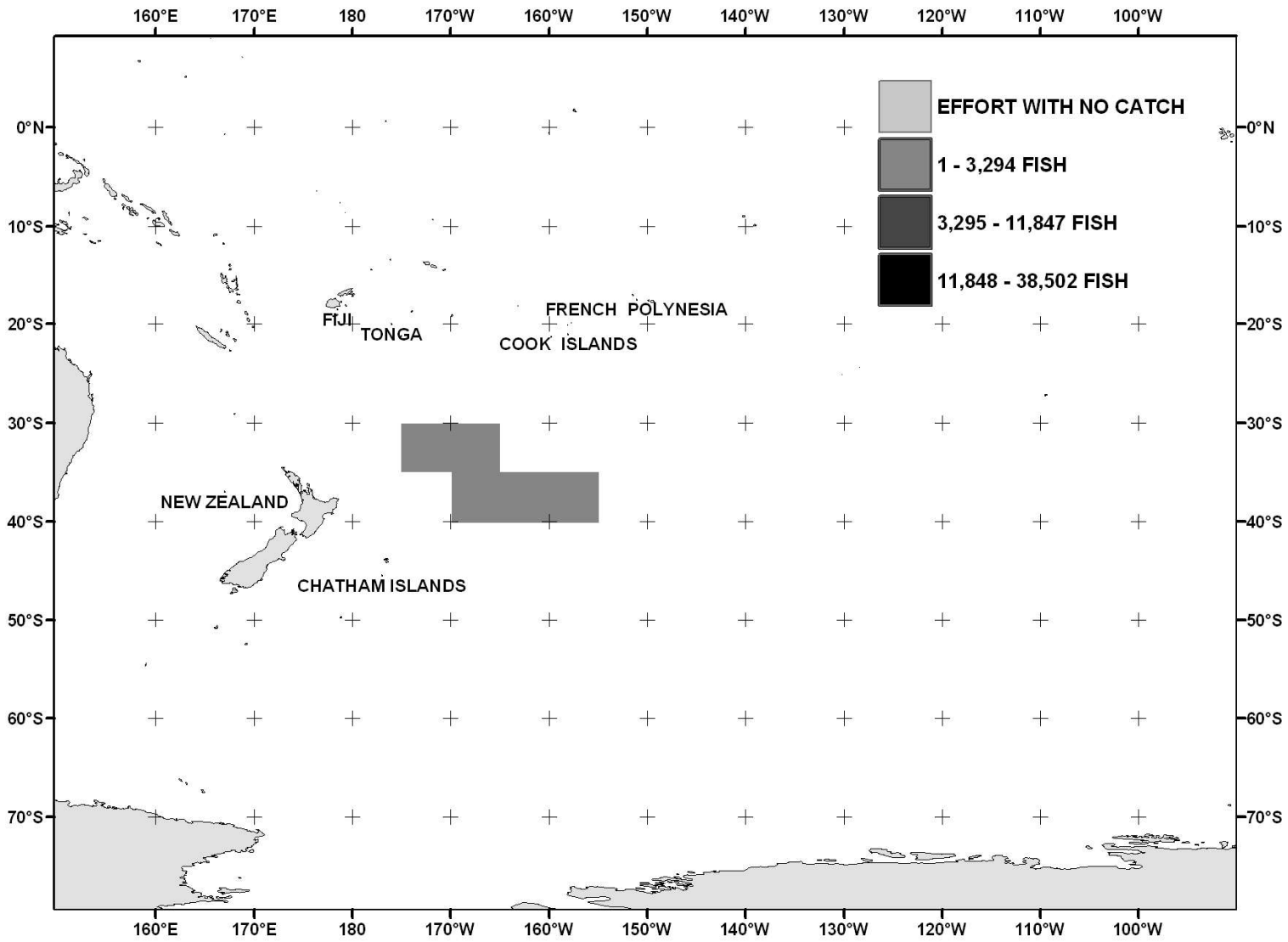

Figure 3b. Distribution of albacore catches by U.S. troll vessels in December 2002.

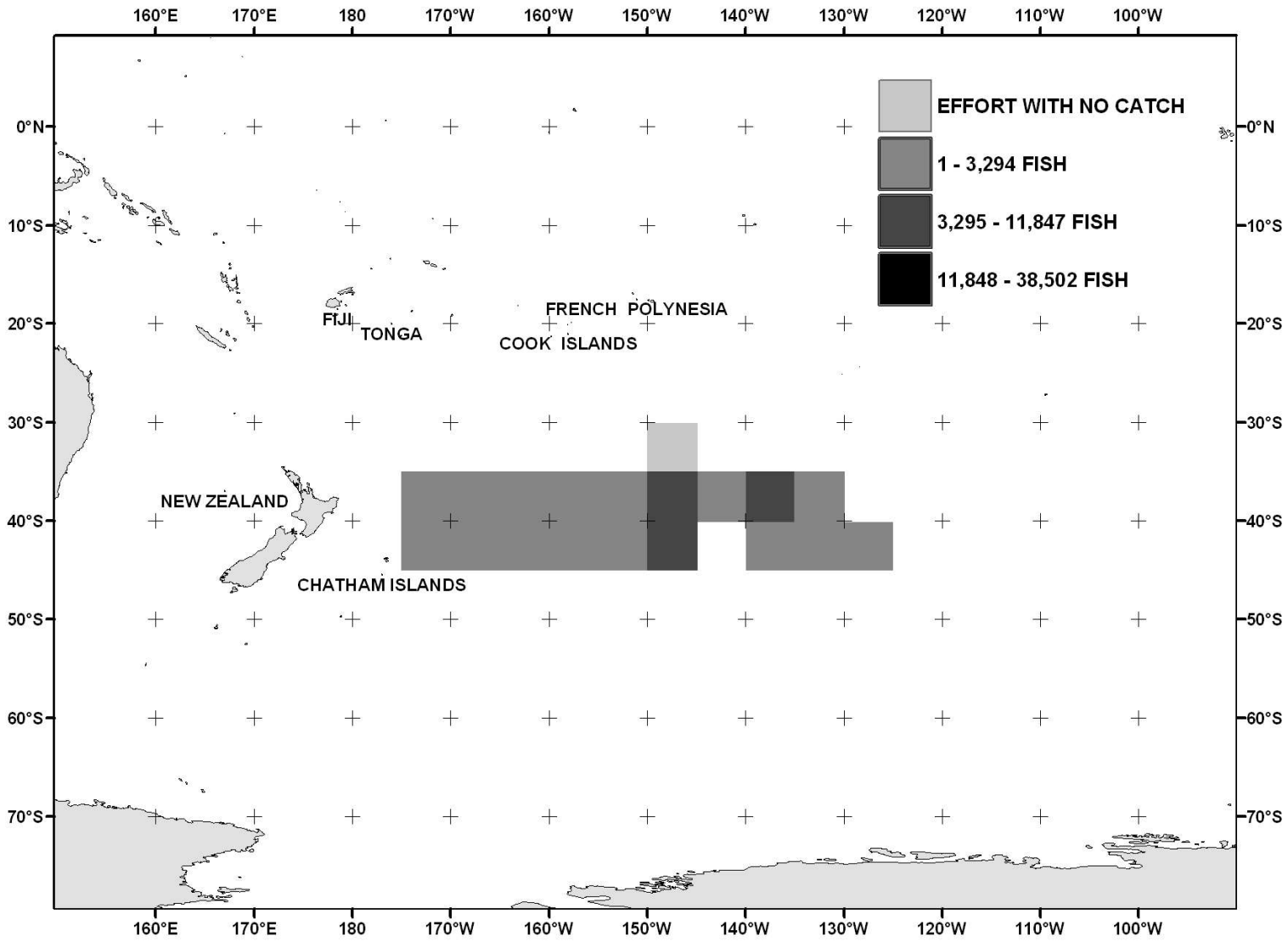

Figure 3c. Distribution of albacore catches by U.S. troll vessels in January 2003.

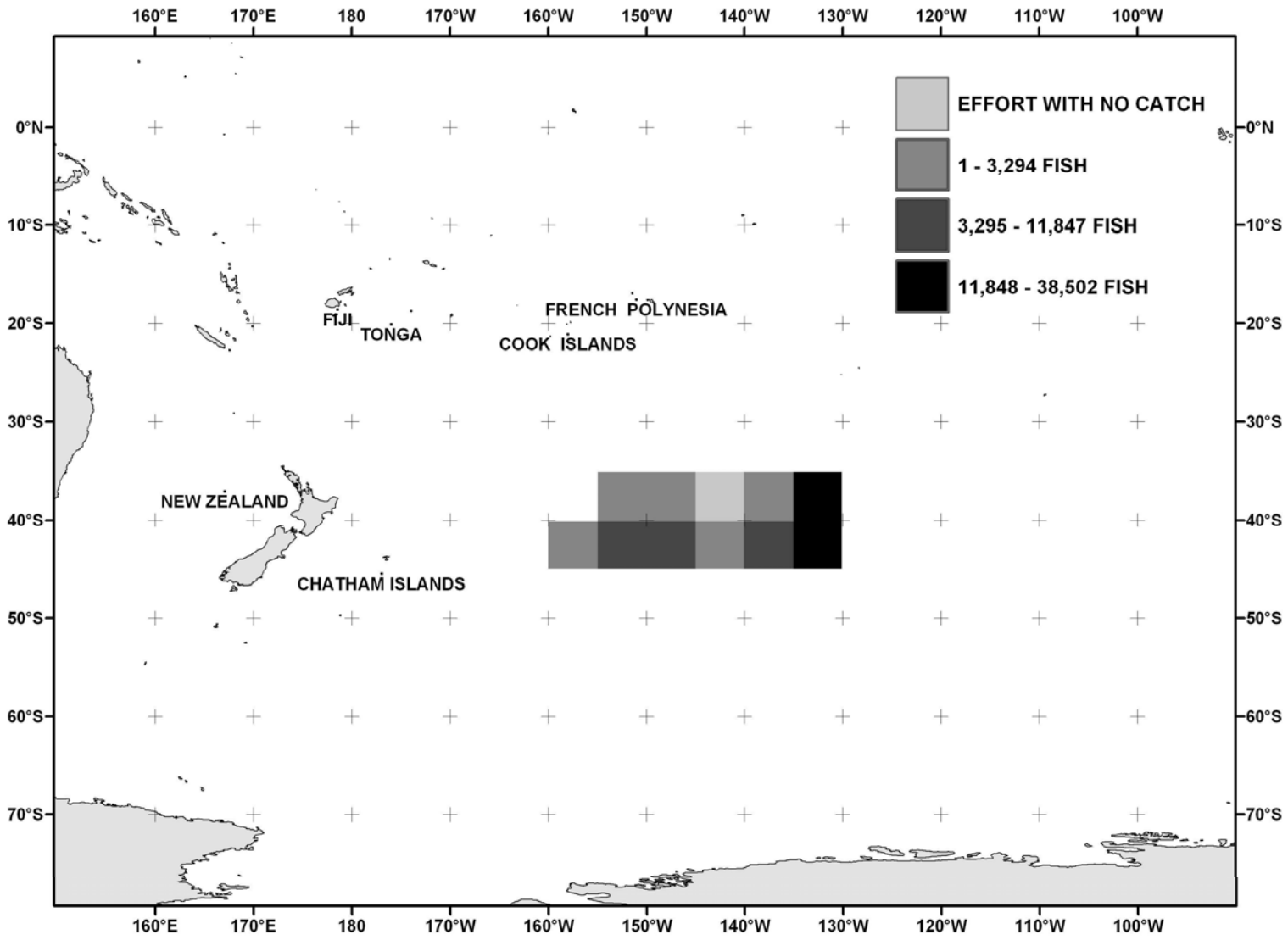

Figure 3d. Distribution of albacore catches by U.S. troll vessels in February 2003.

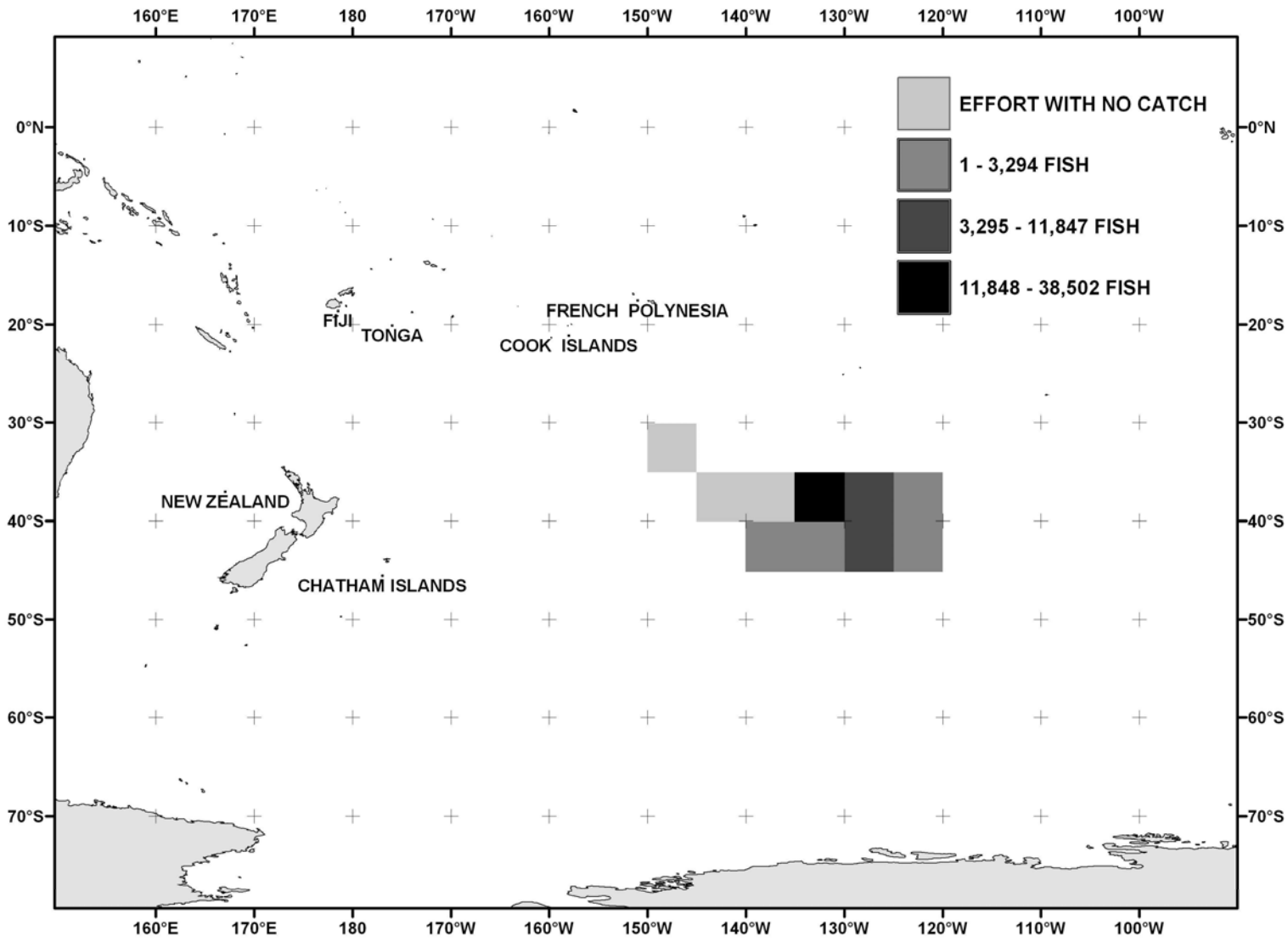

Figure 3e. Distribution of albacore catches by U.S. troll vessels in March 2003.

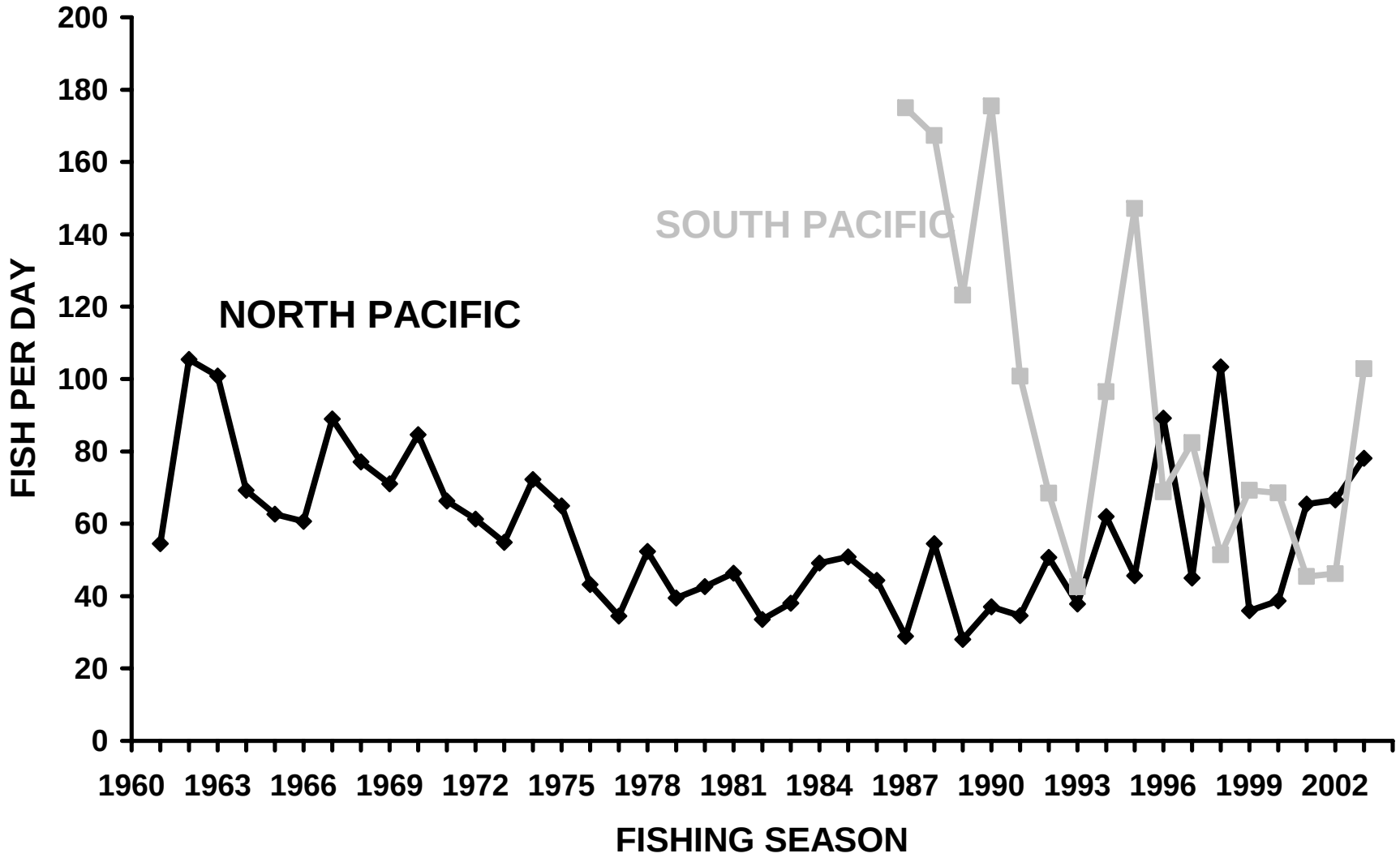

Figure 4. North and South Pacific albacore CPUEs by U.S. troll vessels from 1961 through 2003.

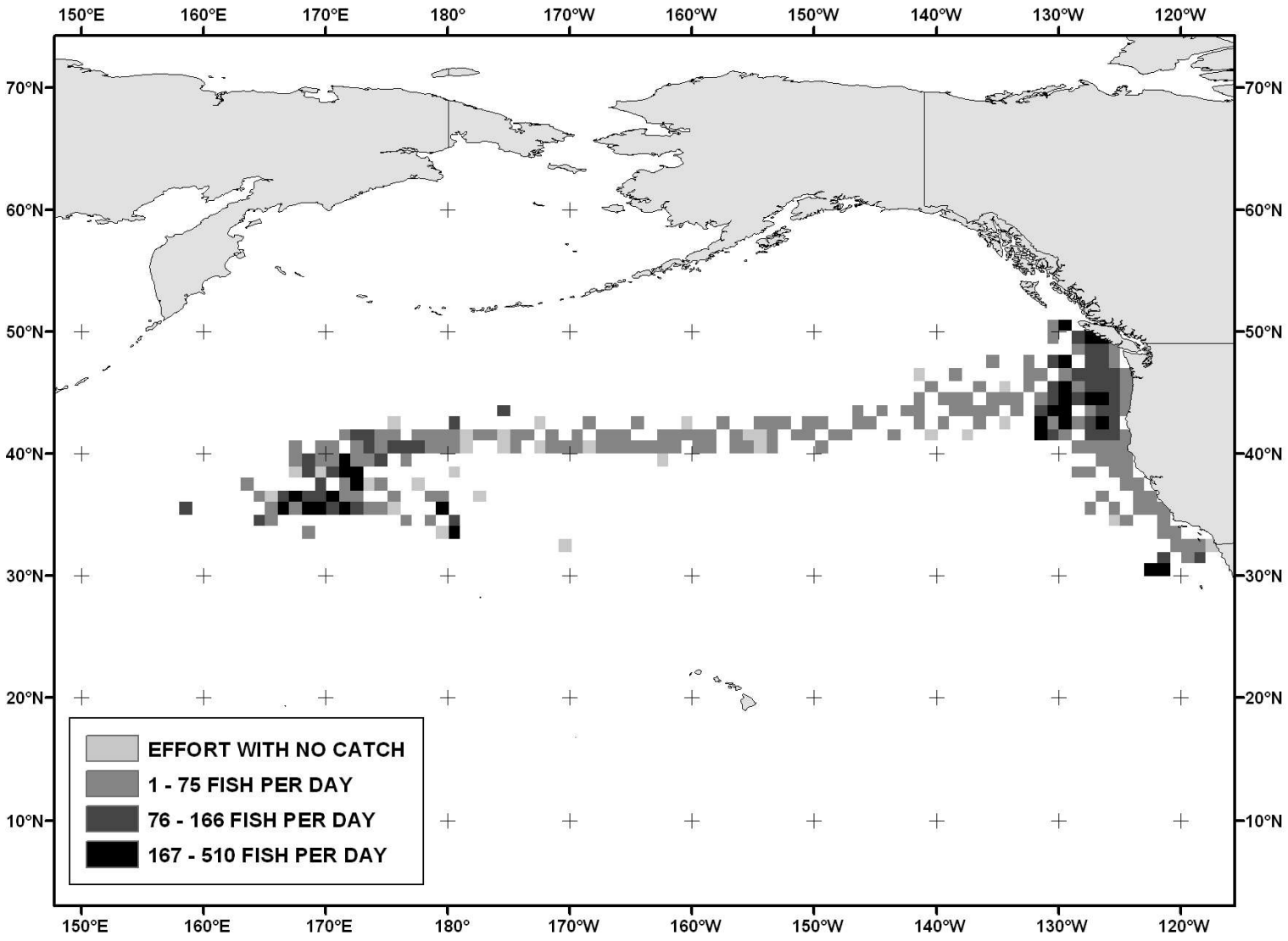

Figure 5. Distribution of albacore CPUEs by U.S. troll vessels in the 2003 North Pacific season.

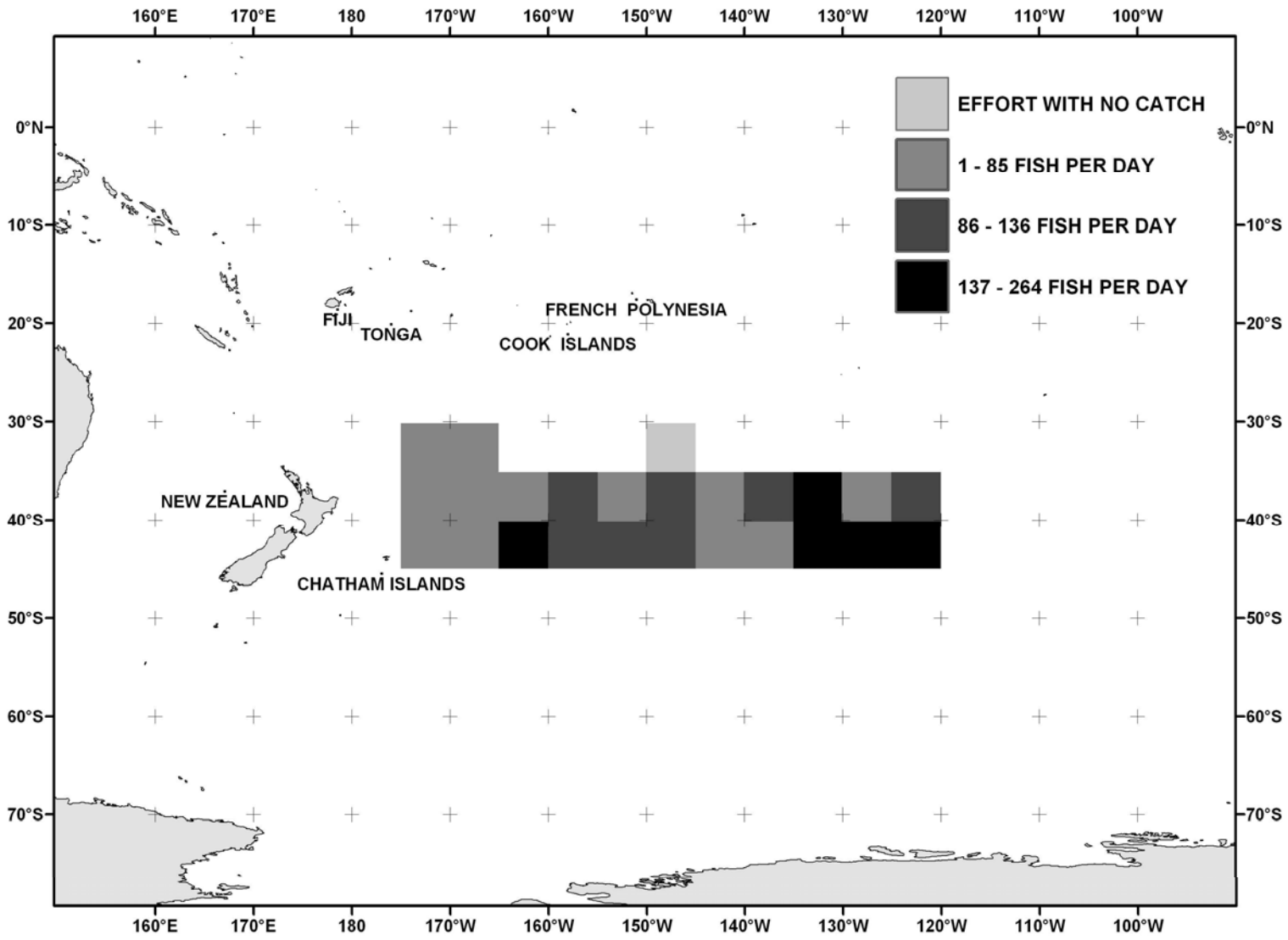

Figure 6. Distribution of albacore CPUEs by U.S. troll vessels in the 2002-2003 South Pacific season.

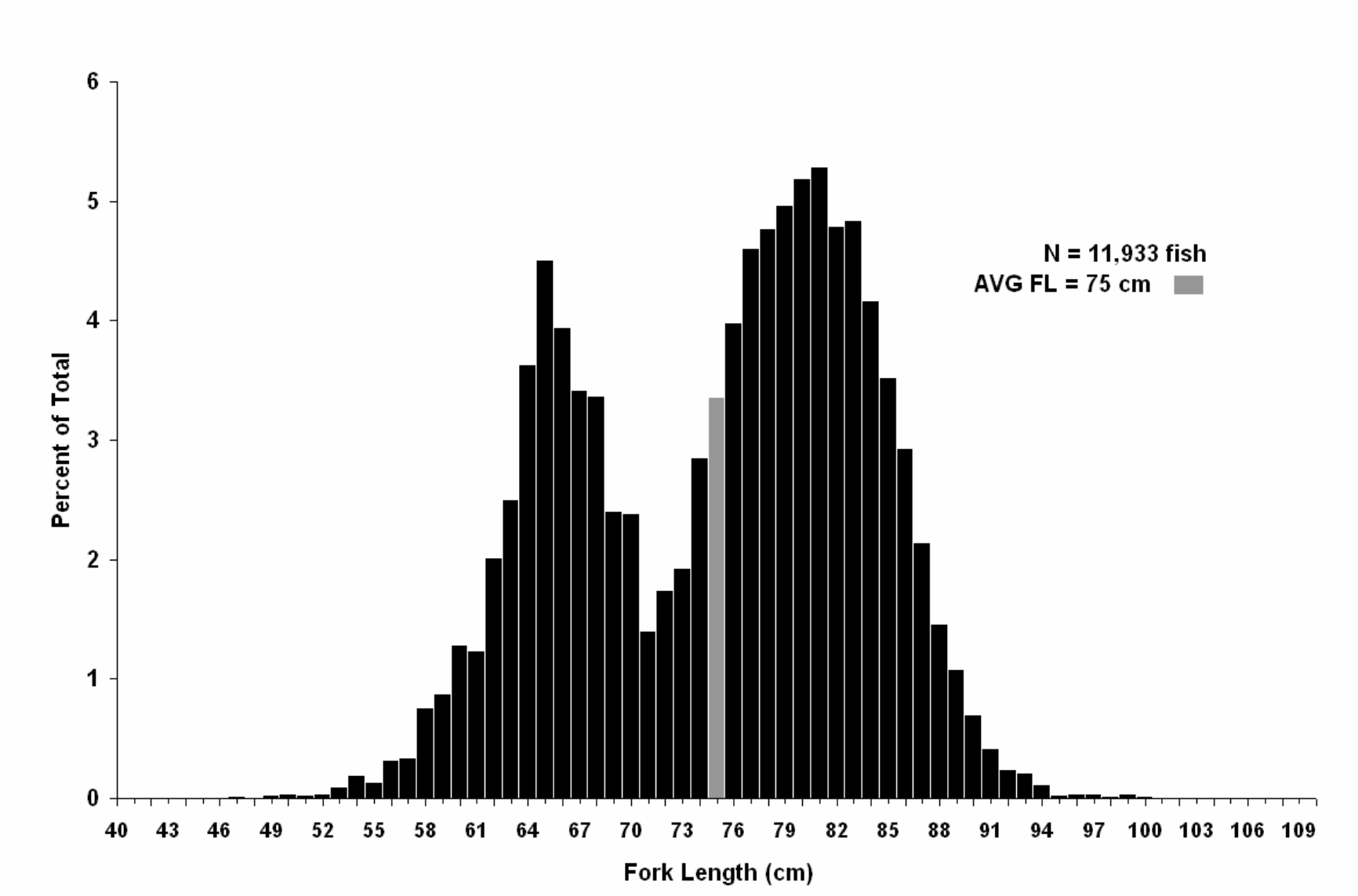

Figure 7. Length frequency histogram of North Pacific albacore caught by U.S. troll vessels during the 2003 season.

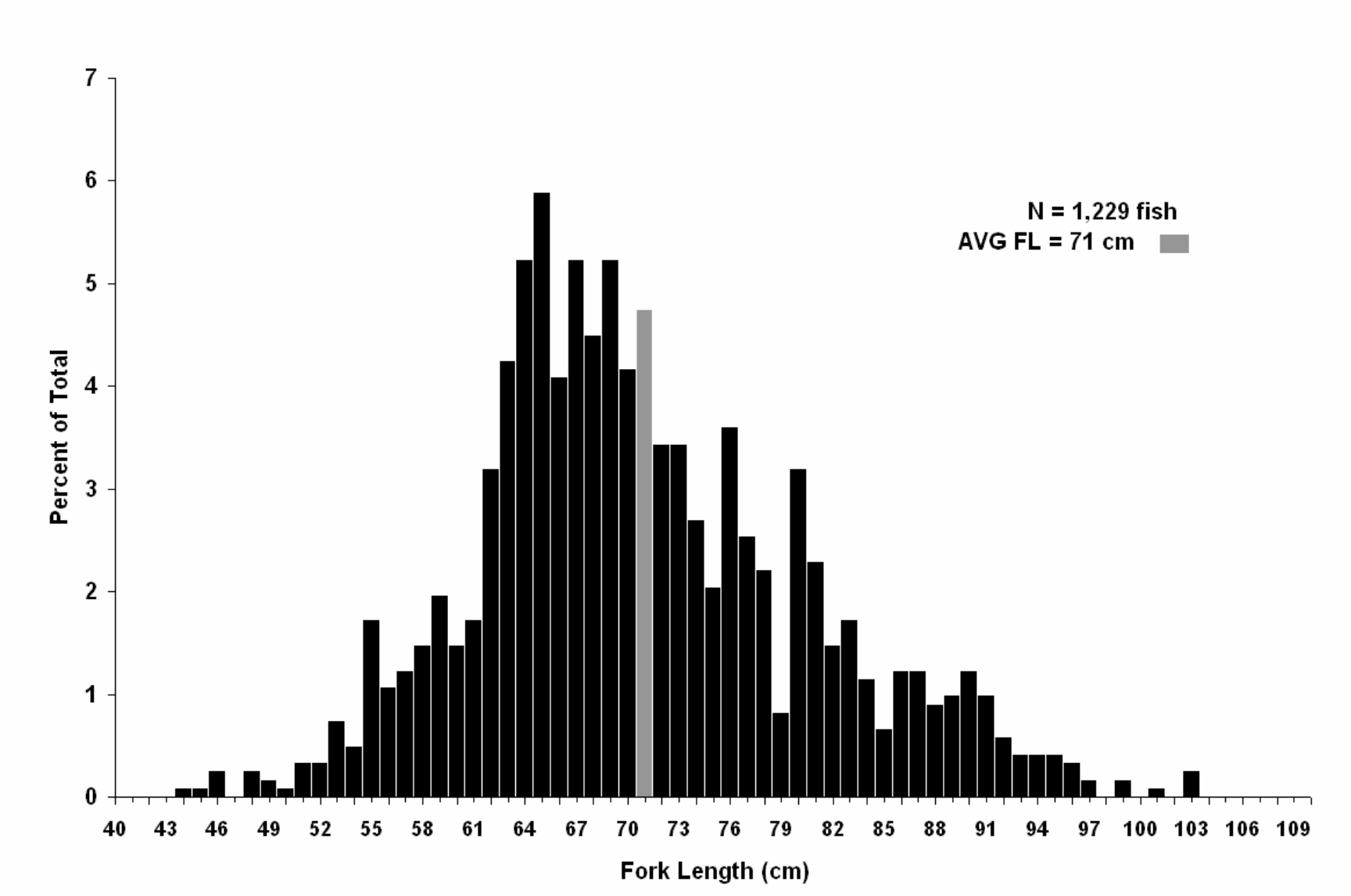

Figure 8. Length frequency histogram of South Pacific albacore caught by U.S. troll vessels during the 2002-2003 season.